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## Data Structures & Algorithm

### Data Structures:

Data Structures is a way of organizing data in such a way that we can perform operations on the data structures in an effective way. Some data can be stored in different data structures. Each data structures has its own benefits & limitations.

### Good Program:

A program can be called a good or effective it has:



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- i] Less no. of instructions
- ii] Time/Memory Effect
- iii] Good program requires analysis of problem to determine basic operations.
- iv] Quantify resource constraints.
- v] Select appropriate data structure.

### Types of Data - Structure

There are two types of Data - Structure:

- i] Primitive
- ii] Non-Primitive



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Primitive

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Data Struct

Built-in

Float

Integer

Char

Pointer

i Integer - Stores Integer value

ii Float - Stores Decimal value

iii Char - Stores Char value [a-z]

iv Pointer - Points at a particular memory address



## ii] Non-Primitive

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### Data - Structures

#### User Defined

Array

Files

Lists

Linear

Non-Linear

Stacks

Graph

Trees

Queues

i] Array -  
finite  
data type  
in an  
location

int a[10]

34

a[0] a

ii] Linked  
a coll  
called  
stores  
The d  
& sec  
next



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1] Array - An Array is a finite collection of similar data types elements stored in an adjacent memory locations.

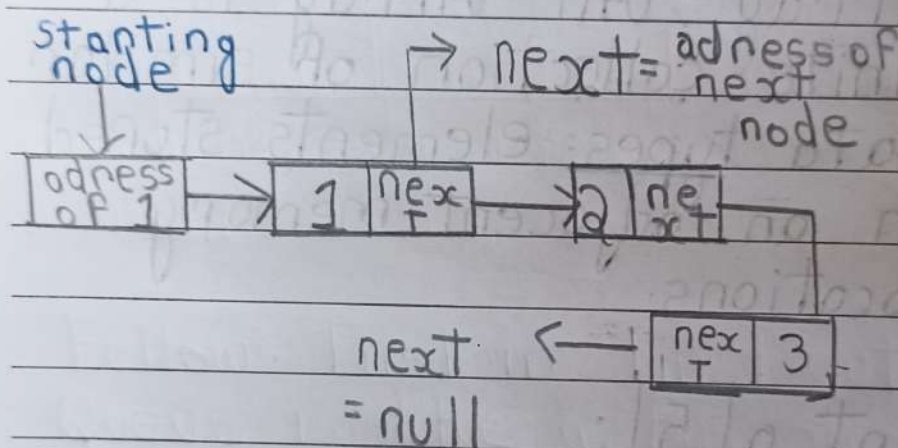
int a[5];

34	1	5	-6	12
a[0]	a[1]	a[2]	a[3]	a[4]

2] Linked List - Linked List is a collection of elements called nodes, each node stores 2 items of info. 1] The data of that element & second the address to the next node.



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Stack - Stack is a data structure in which addition of new element or deletion of an existing element takes place at the same end. The end is known as top of stack. Follows Last in First Out

Array & List  
2 origin  
others  
using the  
called Ab  
Structure

Queue - Q  
data str  
insertion  
one end  
end

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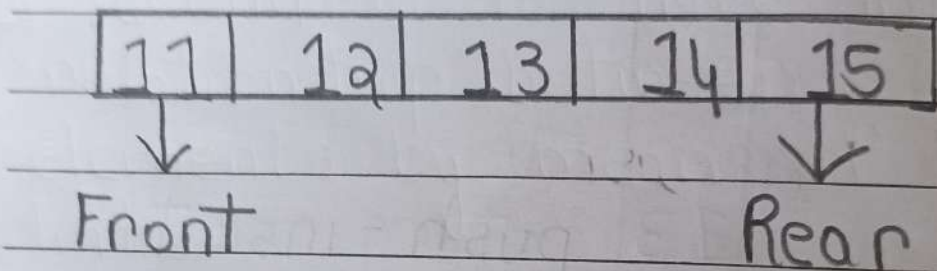
13	push - insert
12	pop - delete
11	peak - display

Array & Linked List are the 2 original data structures others are implemented using these 2 & they are called Abstract Data Structures.

Queue - Queue is a linear data structure that permits insertion of new element at one end & deletion at other end.

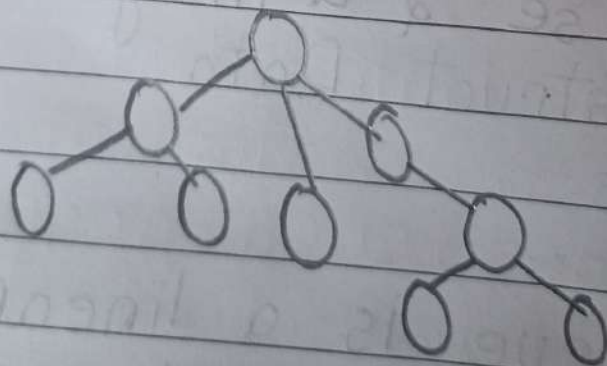


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Follows First in First out  
Queue is like a Bus Stop  
the first element gets  
First Serve

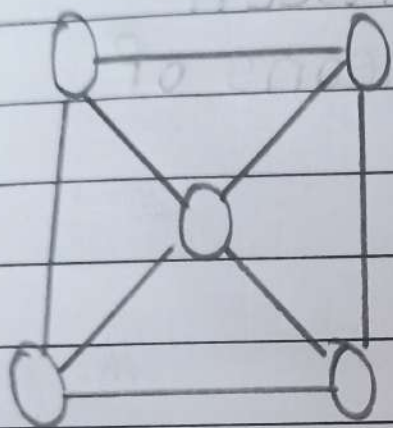
Trees -





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graph -



Linear & Non-Linear Data:

Linear -

1 Includes Arrays, Linked Lists, queues, stacks. They can be represented in memory in 2 ways:

1 First is to have linear relationship between elements by means of sequential memory allocation.